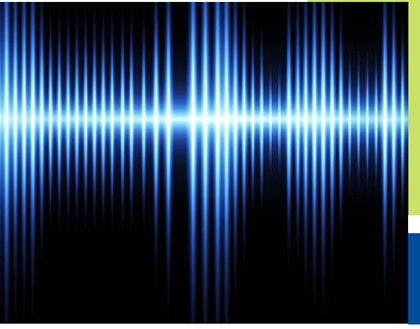

Exposure to Mild Occupational Noise and Brain Malleability in Recognizing Words.

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Background

- Choi et al. (2015) found that multi talker babble is one of the hardest background noises to understand speech in.
- There is evidence for a relationship between long term occupational auditory training and improved speech in noise (SIN) perception in Air Traffic Controllers (De Miguel et al.,2016).
- Musicians have been proven to have improved SIN perception compared to non musicians (Clark, Kraus & Skoe, 2009; Wood, 2019).
- O'Connell et al. (2015) found that SIN perception can be improved with just 2 years of musical training.

Objectives

- To determine the occupational noise exposure of participants via a subjective questionnaire.
- To assess the speech in noise perception of the exposure group and control group
- To examine the correlation between occupational noise exposure and speech in noise perception in the exposure group and control group.

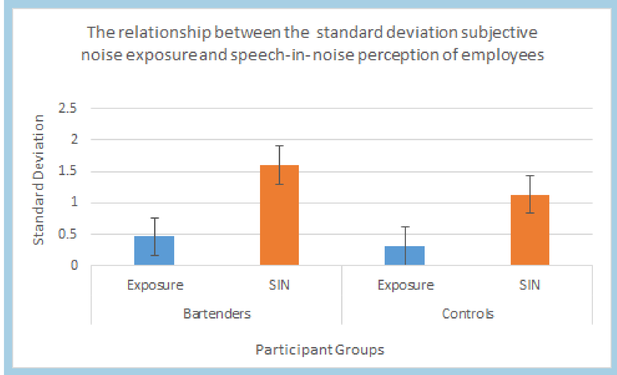
Hypothesis

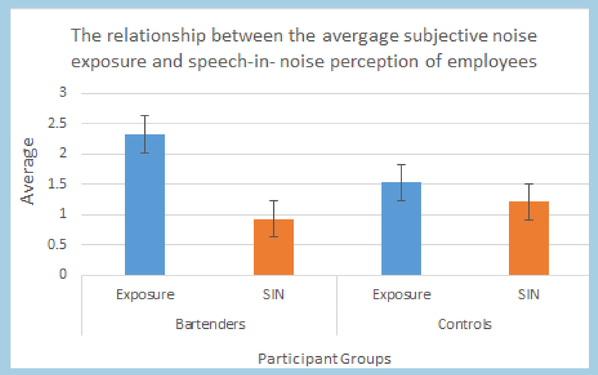
- Exposure to mild occupational noise will positively effect the brains malleability in recognizing speech in noise.

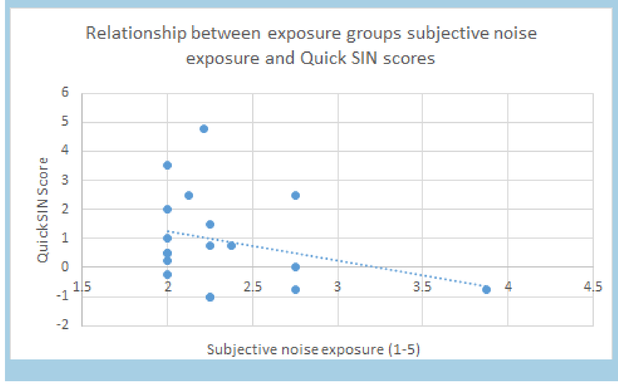
Methods

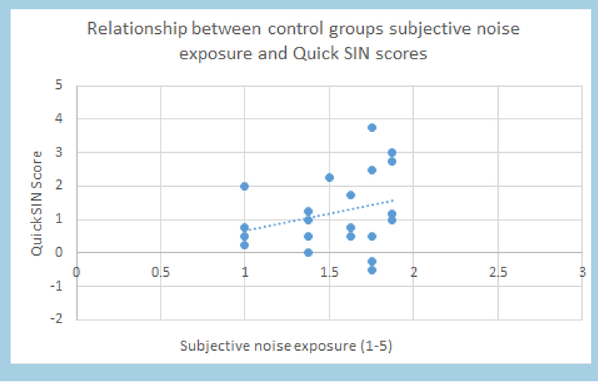
20 young adults (m=24yrs old) who identified as bartenders or servers were recruited from various restaurants and bars in the Greater Toronto Area (GTA). The control group was found to match the bartender and server group in age. Auditory screen tests were conducted through a portable audiometer and calibrated headphones. Participants with greater than 35% hearing loss were not included in the study. Subjective questionnaires were completed via hard copy by the participants. The Quick SIN test by Etymotic Research Inc. was used to evaluate individuals SIN perception. To assess the participants occupational noise exposure, a subjective questionnaire consisting of 9 questions was completed. The current study is an analytical study based on correlation, average differences and standard deviations. All statistical analyses were carried out with Microsoft Excel.

Results









- Avg. subjective **noise exposure for exposure** group was **2.3** (on a scale of 1-5)
- Avg. subjective **noise exposure for control** group was **1.5** (on a scale of 1-5)
- Avg. SIN score for exposure group was 0.93
- Avg. SIN score for control group was 1.2
- **Correlation for exposure groups** noise exposure and SIN score was **-0.3**
- Correlation for control group noise exposure and SIN score was 0.3

Discussion

- The exposure group reported more exposure to occupational noise and had a better performance on the Quick SIN assessment.
- The control group reported less exposure to occupational noise and performed worse on the Quick SIN assessment.
- This finding is consistent with results from previous studies which showed formal training improves SIN perception. (De Miguel et al., 2016; O'Connell et al. ,2015)
- It is also consistent with past studies showing musicians advantage with SIN perception (Clark, Kraus & Skoe, 2009;Wood, 2019)
- Limitations of this study include, improper auditory screening, observer-subject bias, and unaccounted factors in the exposure group.

Conclusion

- Overall, this study is consistent with past studies, showing certain groups exposure to mild noise has improved speech-in-noise perception.
- The current study showed a moderate advantage to bartenders and servers for SIN perception over the control group in relation to their subjective noise exposures.
- These findings could suggest an advantage to mild noise exposure in the workplace and may be used as a tool to improve SIN in other populations.
- More research is needed to measure the extent that mild occupational noise has on brain malleability in different occupational exposure groups

Acknowledgments

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References

1. **Lee, J. Y., Lee, J. T., Heo, H. J., Choi, C. H., Choi, S. H., & Lee, K. (2015). Speech Recognition in Real-Life Background Noise by Young and Middle-Aged Adults with Normal Hearing. Journal of audiology & otology, 19(1), 39–44. https://doi.org/10.7874/jao.2015.19.1.39**
2. **Parbery-Clark, A., Skoe, E., & Kraus, N. (2009). Musical experience limits the degradative effects of background noise on the neural processing of sound. The Journal of neuroscience : the official journal of the Society for Neuroscience, 29(45), 14100–14107. https://doi.org/10.1523/JNEUROSCI.3256-09.2009**
3. **Parbery-Clark, A., Skoe, E., Lam, C., & Kraus, N. (2009). Musician enhancement for speech-in-noise. Ear and Hearing, 30(6), 653-661. doi:10.1097/AUD.0b013e3181b412e9**
4. **Slater, J., Skoe, E., Strait, D. L., O'Connell, S., Thompson, E., & Kraus, N. (2015). Music training improves speech-in-noise perception: Longitudinal evidence from a community-based music program. Behavioural Brain Research, 291, 244-252. doi:10.1016/j.bbr.2015.05.026Zaballos,**
5. **M. T., Plasencia, D. P., González, M. L., de Miguel, A. R., & Macías, Á. R. (2016). Air traffic controllers' long-term speech-in-noise training effects: A control group study. Noise & health, 18(85), 376–381. https://doi.org/10.4103/1463-1741.195804**